

nel-shaped cloud formed 5 miles southeast of Ponca, Okla., and moved southeast to a point 11 miles southeast of Ponca, where 6 persons and a quantity of stock were killed. Heavy rain on the 28th and 29th damaged farms about Lebanon, Mo. Heavy hail damaged fruit, etc., about Saint Charles, Mo. At Hannibal, Mo., hail fell from 11.20 to 11.25 a. m., and the hail was followed by a northeast gale. Damage by hail was reported at Farmland and Muncie, Ind. A thunder and hail storm occurred at Plant City, Fla., in the evening.

29th.—A heavy gust of wind, with thunder, sharp lightning, and rain occurred at Norfolk, Va., in the evening. Near Berkeley, Va., 2 children were killed by lightning. In the early morning a house in Cincinnati, Ohio, was struck by lightning. A stable was struck by lightning in Saint Louis, Mo. Six persons were drowned and property was destroyed

by flood near Winslow, Ark. During the 29th and 30th a heavy snowstorm prevailed in Millard, Beaver, and Iron counties, Utah.

30th.—A thunderstorm, with rain and hail, moved southeast over Wheeling, W. Va., at 5.15 p. m. A thunderstorm, with heavy rain, occurred at Cincinnati, Ohio, in the evening; great damage was caused by flood in the Mill Creek and Miami valleys. At Wyoming, near Cincinnati, a church steeple was demolished by lightning. A destructive storm was reported near Annapolis, Ohio. Late in the afternoon a violent thunderstorm moved from the southwest over Louisville, Ky. At 6.30 p. m. the wind reached an extreme velocity of 54 miles per hour. A destructive storm, with rain and hail, visited Eola, La., at 9 p. m., demolishing houses, uprooting trees, and damaging crops.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, April, 1898.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Shreveport, La.	29.9	19.4	1	12.1	17-19	7.3
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	24.2	30	2.9	10, 11	21.3
Little Rock, Ark.	23.0	19.9	30	6.6	12, 13	13.3
<i>Missouri River.</i>						
Fort Buford, N. Dak. * ..		13.1	7	7.9	27, 28	5.2
Pierre, S. Dak.	14.0					
Sioux City, Iowa.	18.7	15.4	11	6.6	1	8.8
Omaha, Nebr.	18.0	15.1	12	7.1	2	8.0
Kansas City, Mo.	21.0	18.1	14	9.1	1	9.0
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	12.4	30	7.3	1	5.1
La Crosse, Wis. †	11.8	10.5	8, 9	7.4	3	4.4
Dubuque, Iowa.	16.0	14.6	23, 24	6.2	1, 2	10.4
Davenport, Iowa.	15.0	12.2	24	5.5	4	6.7
Kokuk, Iowa.	14.0	13.7	26, 29, 30	7.6	5	6.1
Hannibal, Mo.	17.0	15.5	30	9.0	7, 8	6.8
Saint Louis, Mo.	30.0	29.0	30	15.9	16	13.1
Cairo, Ill.	40.0	43.7	23, 24	23.9	10	19.8
Memphis, Tenn.	33.0	35.9	30	17.4	12, 13	15.5
Vicksburg, Miss.	41.0	40.8	30	30.0	17	10.8
New Orleans, La.	13.0	13.8	1, 2	10.0	18, 20, 21	3.8
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	24.4	24	8.2	5	16.2
Cincinnati, Ohio.	45.0	42.8	30	15.6	6	27.2
Louisville, Ky.	24.0	15.7	30	7.0	7	8.7
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	24.8	17	5.8	5, 6	19.0
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	12.1	15	4.8	13	7.3
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	18.1	22	5.5	1	12.6
<i>Savannah River.</i>						
Augusta, Ga.	32.0	13.1	22	6.1	20	7.0
<i>Willamette River.</i>						
Portland, Oregon.	15.0	10.4	4-6	6.4	18, 19	4.0
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	10.9	23	5.2	30	5.7
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	11.2	21	4.7	14	6.5
<i>James River.</i>						
Lynchburg, Va.	18.0	6.0	28	0.8	16	5.2
<i>Sacramento River.</i>						
Red Bluff, Cal.		21.4	6	6.5	20, 21	14.9
Sacramento, Cal.		25.2	8	23.3	22	1.9

* For 24 days. † For 28 days.
‡ Carrollton gauge readings from 4th to 30th, inclusive.

FLOODS.

On the 10th the Missouri River reached 15.7 feet at Sioux City, Iowa, damaging the construction work of the Pacific Short Line Bridge to the extent of \$5,000. Disastrous overflows of streams were reported in Minnesota and North Dakota. From the 28th to the 30th the Arkansas River rose rapidly at Fort Smith, Ark., and bottom lands in that section were submerged. At the close of the month the Mississippi

River was high and rising rapidly throughout its course. The Ohio, Wabash, and Arkansas rivers were also rising rapidly.

ICE IN RIVERS AND HARBORS AND OPENING OF NAVIGATION.

Navigation opened at Charlotte, N. Y., on the 1st, at Oswego, N. Y., on the 5th, and at Buffalo, N. Y., on the 15th. Navigation between Sandusky, Ohio, and Detroit, Mich., opened on the 10th. A steamer from Detroit arrived at Port Huron, Mich., on the 1st, opening navigation on the Saint Clair River. On the 3d a steamer left Port Huron for Sand Beach, opening navigation to that point. On the 9th a steamer arrived at Port Huron from Oscoda, Mich.; this was the first arrival of the season from a northern port. The first through boat of the season from Chicago, Ill., arrived at Port Huron on the 18th. On the 2d the river and bay at Alpena, Mich., were free from ice. At Sault Ste. Marie, Mich., ferryboats began running on the 18th. The boats landed at the lower dock, the upper dock being obstructed by ice. On the 28th ice moved from Mud Lake and Whitefish Point, leaving the river at Sault Ste. Marie free from ice. On the 29th a tug arrived at Sault Ste. Marie from Port Huron, opening navigation. On the 29th and 30th the river at Sault Ste. Marie was full of floating ice. Navigation opened at Manistee, Mich., on the 1st. High wind on the 12th cleared the Straits of ice at Cheboygan, Mich., and a schooner sailed for Drummonds Island; this was the first departure of the season. On the 18th a steamer from Detroit arrived at Cheboygan; this was the first arrival of the season. The harbor was reported clear of ice and navigation opened at Ludington, Mich., on the 7th. On the 18th a steamer from Chicago, bound for Buffalo, passed through the Straits of Mackinac. Considerable drift ice was encountered. The first boat of the season, excepting the regular winter-line boats, arrived at Grand Haven, Mich., on the 4th. At Green Bay, Wis., ice in the river was melting rapidly on the 2d, with spaces of clear water; 3d, river clear of ice, except near the shore; 13th, bay clear of ice; 17th, the first departure of the season; and 18th, the first arrival of the season. Navigation opened at Milwaukee, Wis., on the 13th, and at Chicago, Ill., on the 17th.

Ice went out of Lake Champlain at Burlington, Vt., on the 13th, and navigation at that port was resumed on the 17th. The Lake was reported clear of ice from Whitehall to Rouses Point on the 25th. The Kennebec River opened at Gardiner, Me., on the 12th. Navigation opened on the upper Saint Lawrence River by the 13th. The Fox River, Wisconsin, opened to the bay on the 3d, and the first steamer of the season passed through the locks on the 9th. Ice passed out of the Saint Croix River, Wisconsin, on the 10th. On the 25th the first

steamer of the season passed up the Saint Croix River at Hudson, Wis. Ice in the Red River of the North began to move at Grand Forks, N. Dak., on the 19th, and navigation opened at that point on the 28th. Ice ran out of the Minnesota River at Granite Falls, Minn., on the 6th.

Mississippi River.—At Minneapolis, Minn., ice was passing out of the river on the 2d; 3d, river rising and nearly clear of ice; 5th, a boom 5 miles above the city gave way, and large quantities of ice and logs passed Minneapolis. At Saint Paul, Minn., ice passed out on the 2d, and on the 30th the first boat of the season from Saint Louis, Mo., arrived. At Red Wing, Minn., ice was moving on the 2d; 3d, ice on Lake Pepin reported unsafe for teams; 6th, river clear of ice, and ferryboats resumed trips; 26th, the first raft boat of the

season passed down the river; 28th, the first up river boat of the season passed Red Wing. The river was clear of ice at Saint Cloud, Minn., on the 16th. At La Crosse, Wis., ice began to move on the 2d; 4th, river nearly clear of ice and rising rapidly; the first boat of the season passed through the bridge; 7th, the first boat of the season for up river ports arrived.

Missouri River.—On the 1st the river was high and rising and the ice very rotten at Fort Buford, N. Dak.; 2d, ice gorge opposite the Post broke, and ice ran out rapidly. Ice broke and navigation opened at Bismarck, N. Dak., on the 3d. Ice broke at Pierre, S. Dak., on the 1st; 2d to 10th, running ice; 17th, a steamer passed up the river; 28th, the first steamer of the season from Bismarck, arrived.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 21, on the 3d, 6th, and 8th; in 15 to 20 on the 4th, 5th, 7th, 9th to 14th, 18th, 19th, 20th, 25th, 26th, 28th, 29th, and 30th; in 10 to 14 on the 2d, 15th, 17th, 24th, and 27th; and in 5 to 9 on the 1st, 15th, 21st, 22d, and 23d. There were no dates on which thunderstorms were not reported.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 26, in Illinois; on 20 to 25 in Indiana, Kansas, Missouri, North Carolina, Ohio, and Texas; on 15 to 19 in Alabama, Arkansas, Florida, Iowa, Kentucky, Michigan, Mississippi, Pennsylvania, Tennessee, and West Virginia; on 10 to 14 in Louisiana, Maryland, Nebraska, New Jersey, New York, Virginia, and Wisconsin; on 5 to 9 in Connecticut, Massachusetts, Minnesota, Oklahoma, South Carolina, South Dakota, and Vermont; and on one to 4 in Delaware, District of Columbia, Indian Territory, Maine, New Hampshire, North Dakota, and Rhode Island.

West of the Rocky Mountains thunderstorms were reported in California on the 6th, 9th, 22d, and 27th; in Colorado on the 11th, 18th, 22d, 25th, 28th, and 29th; in Idaho on the 22d; in Nevada on the 22d, 23d, and 30th; in New Mexico on the 30th; in Utah on the 22d to 26th, 29th, and 30th; in

Washington on the 3d, 5th, 16th, 22d, and 26th; in Wyoming on the 6th and 7th. In states and territories other than those named no thunderstorms were reported.

AURORAS.

Auroras were reported as follows: 3d, Turin, N. Y. 4th, South Canistota, N. Y. 5th, Camp Dennison, Ohio. 6th, Eastport and Lewiston, Me. 7th, Ada, Minn.; Ericson, Nebr. 8th, Blue Hill, Mass. 9th, Valley Junction, Wis. 11th, Storrs, Conn.; Bar Harbor, Cornish, Eastport, Gardiner, Houlton, Lewiston, and Presque Isle, Me.; North Billerica and Royalston, Mass.; Ada, Minn.; Hanover, Lancaster, Newton, and Plymouth, N. H.; Chelsea, Northfield, and Norwich, Vt.; Sparta, Wis. 12th, Eastport and Houlton, Me.; Bar Harbor and Concord, Mass.; Littleton, N. H. 13th, Caldwell, Mich.; New Brunswick, N. J.; Baldwinsville, N. Y.; Manitowoc, Wis. 14th, Greenhorn, Colo.; Sault Ste. Marie, Mich.; Clear Lake and Fergus Falls, Minn.; Mayville, N. Dak. 15th, Greenhorn, Colo.; Concord, Mass. 16th, Collegeville, Minn.; Medford, Wis. 17th, Collegeville, Minn. 18th, Cornish, Me.; Turin, N. Y.; Chelsea, Vt. 19th, Cornish, East Machias, and Easton, Me.; Hanover and Plymouth, N. H.; Turin, N. Y.; Chelsea, Vt. 20th, Seymour, Ind.; Mayfield, Me. 22d, Greenhorn, Colo.; Lowell, Ohio. 23d, Mayville, N. Dak. 24th, Toms River, N. J. 25th, Pioche, Nev.; Keokuk Falls, Okla. 26th, Eastport, Houlton, Gardiner, and Lewiston, Me.; Turlington, Nebr.; Chelsea, Vt. 28th, Worthington, Ind.; Boon, Mich.; Willmar, Minn.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for April, 1893, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 3.8 above the normal; maximum, 90, at Newburg, 5th; minimum, 32, at Newburg, 22d and 24th; greatest monthly range, 58, at Newburg; least monthly range, 32, at Daphne.

Precipitation.—The average was 1.07 below the normal; greatest monthly, 9.95, at Florence; least monthly, 0.88, at Greensboro.

Wind.—Prevailing direction, south.—P. H. Mell, Observer, Weather Bureau, Auburn, director.

ARIZONA.

Temperature.—The mean was 1.5 above the normal; maximum, 102, at Palomas, 21st; minimum, 15, at Whipple Barracks, 30th; greatest monthly range, 67, at Palomas; least monthly range, 41, at Fort Bowie.

Precipitation.—The average was 0.50 below the normal; greatest monthly, trace, at Tucson; least monthly, 0.00, at all other stations.

Wind.—Prevailing direction, southwest.—W. Burrows, Observer, Weather Bureau, Tucson, director.

ARKANSAS.

Temperature.—The mean was 1.7 above the normal; maximum, 94, at Hot Springs, 4th, and at Fort Smith, 5th; minimum, 29, at Keesees Ferry, 15th; greatest monthly range, 64, at Hot Springs; least monthly range, 43, at Greenville, Miss.

Precipitation.—The average was 2.65 above the normal; greatest monthly, 13.22, at Rogers; least monthly, 8.64, at Fulton.

Wind.—Prevailing direction, south.—F. H. Clarke, Local Forecast Official, Weather Bureau, Little Rock, director.

CALIFORNIA.

Temperature.—The mean was 2.4 below the normal; maximum, 105, at Volcano Springs, 21st; minimum, 10, at Cisco, 7th; greatest monthly range, 64, at Tulare and Pasadena; least monthly range, 19, at Point Lobos.

Precipitation.—The average was 0.80 below the normal; greatest monthly, 12.12, at Crescent City; least monthly, 0.00, at a number of stations in the southern part of the state.